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ERASURE PROCESS FOR DRY TRANSFER PIGMENTED INKS

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ABSTRACT OF THE DISCLOSURE

An erasure process for the substantial removal of a dry transfer pigmented ink from an encoded medium which comprises applying a composition comprising an elastomeric material and a volatile organic solvent to the encoded surface of a medium as a substantially continuous thin film. The volatile organic solvent is then evaporated from the composition thereby leaving a thin, substantially dry elastomeric film on the surface of the medium. The elastomeric film is then removed from the encoded surface thereby removing dry transfer pigmented ink from the medium contacted by the elastomeric film without any substantial damage to the erased medium.

BACKGROUND OF THE INVENTION

This invention relates to an erasure process for the substantial removal of a dry transfer pigmented ink from an encoded medium by means of a composition comprising an elastomeric material and a voltile organic solvent. More particularly, the erasure process of the present invention relates to a process wherein a composition comprising an elastomeric material and a voltile organic solvent is applied to the encoded surface of the medium as a substantially continuous thin film. The volatile organic solvent is then allowed to evaporate leaving a thin, substantialy dry elastomeric film on the surface of the medium. The thin, substantially dry elastomeric film is then removed from the encoded surface thereby removing dry transfer pigmented ink from the medium contacted by the thin elastomeric film.

Removal of dry transfer pigmented inks from an encoded medium by means of conventional rubber erasers, mechanical scrapers, chemical treating solutions and organic solvent treating solutions is known in the art. These prior art erasure processes suffer many disadvantages. Among these disadvantages are the slow speed at which erasure is accomplished and damage or destruction to the erased medium. Prior art erasure processes are disclosed in U.S. Patents 2,767,650; 2,884,348; 2,881,101; 3,039,435; 3,104,173; 3,112,151; 3,282,853 and 3,293,650.

The prior art process disclosed in U.S. Patent 3,112,151 for removing dry transfer magnetic ink from an encoded medium comprises the application of an organic solvent or a mixture of organic solvents with a dauber or other applicator means to the encoded characters desired to be erased. The application of the solvent is followed by rubbing of the encoded characters to obtain separation of the ink from the surface of the medium. The surface of the medium is then blotted to remove the ink therefrom. The use of such organic solvents may not produce satisfactory erasure of the medium since the medium is wetted by the solvent for a relatively long period of time after the solvent has been applied. This results in solvent bleed into other areas of the medium which can damage the signature or other printed areas of the medium. The wetting of the medium by the solvent can also result in smudging and incomplete erasure when the surface of the medium is rubbed and blotted.

The erasure process of the present invention offers a highly desirable combination of advantages over prior art processes which utilize conventional rubber erasures, mechanical scrapers, chemical treating solutions or organic solvent treating solutions. For example, the erasure process of the present invention is rapid and does not produce any significant damage or destruction of the erased medium. Furthermore, there is virtually no solvent bleed in the erasure process of the present invention and consequently there is no damage to the signature or other printed areas of the erased medium. Since the erasure process of the present invention does not adversely affect the surface of the erased medium, the medium can be re-encoded with the same dry transfer pigmented ink as was used for the original encoding or a different dry transfer pigmented ink. The print quality of the re-encoded medium is generally comparable to the print quality of an originally encoded medium.

Dry transfer pigmented inks containing magnetic oxides as pigments are in widespread use to encode information on commercial paper used by finanical and banking instiutions in magnetic ink character recognition (MICR) systems. When it becomes necessary to erase such encoded information, the erasure process of the present invention is especially useful.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided an erasure process for the substantial removal of a dry transfer pigmented ink from an encoded medium by means of a composition comprising an elastomeric material and a volatile organic solvent. In the erasure process of the present invention, the composition comprising an elastomeric material and a volatile organic solvent is applied to the encoded surface of the medium as a substantially continuous thin film. The organic solvent is then evaporated from the composition thereby leaving a thin, substantially dry elastomeric film on the surface of the medium. The thin, substantially dry elastomeric film is then removed from the surface of the medium thereby removing dry transfer pigmented ink from the medium contacted by the thin elastomeric film without any substantial damage to the erased medium. The composition comprising the elastomeric material and the organic solvent generally contains about 5 to 30, preferably about 10 to 15, weight percent elastomeric material, based on the weight of the elastomeric material and the organic solvent. The composition comprising the elastomeric material and the organic solvent generally has a viscosity of about 50 to 40,000, preferably about 600 to 11,000, centipoises. The viscosity of the composition comprising the elastomeric material and the organic solvent should be such as to be easily applied to the encoded area which is desired to be erased to obtain a thin film of elastomeric material having a thickness of about 0.5 to 5, preferably about 1 to 2, mils when dried.

DETAILED DESCRIPTION OF THE INVENTION

The term dry transfer pigmented ink as used in the present invention is an ink comprising pigment particles incorporated in a binder material. The pigment particles can be dispersed or dissolved in the binder material. The ink is usually printed on a suitable medium by an impact printer and the binder material bonds the pigment particles to the surface of the medium. The binder material merely acts as a means of bonding the pigment particles to the surface of the medium and there is no significant penetration of the pigment particles into the medium. There is also no significant dyeing of the medium either by the pigment particles or the binder material.

The pigment particles can be either an organic or inorganic material or a mixture thereof. Especially suit-

able pigments are finely divided magnetic materials. The magnetic material may be a finely divided metal such as iron, cobalt and nickel and mixtures or alloys thereof, a metal oxide such as iron oxide, cobalt oxide and nickel oxide and mixtures thereof.

The binder material within which the pigment particles are incorporated can be a natural or synthetic wax, resin, gum, high molecular weight hydrocarbon and the like but more commonly is a mixture of such materials which provides the proper consistency and physical strength. The binder material can carry a small amount of a plasticizing agent, interface modifying agent, viscosity modifying agent and the like so that the binder material, as a whole, will perform in accordance with its intended manner which is to retain the pigment particles in a uniform state of subdivision, adhere to the medium and resist smearing or cracking under ordinary conditions of use.

The volatile organic solvent in the present invention acts as a carrier for the elastomeric material and the volatile organic solvent also softens the binder material of the dry transfer pigmented ink when the composition comprising the elastomeric material and the organic solvent is contacted with the encoded medium. The organic solvent thereby loosens the pigment particles so that they can be removed from the surface of the medium by the substantially dry elastomeric film after the organic solvent evaporates. The volatile organic solvent does not dissolve or appreciably or deleteriously affect the medium and does not attack other matter imprinted on or in the medium such as printed matter, water marks, seals and writing.

The preferred elastomeric material for use in the present invention is natural rubber which is essentially cis-1,4-polyisoprene and is commonly referred to as hevea natural rubber. The uncured, smoked sheet grade of natural rubber is an especially useful elastomeric material. Other suitable elastomeric materials for use in the present invention include such synthetic rubbers as chlorosulfonated polyethylene, chloroprene, ethylene propylene, fluorinated hydrocarbons, isobutylene isoprene, nitrile butadiene, polyacrylic, polybutadiene, polyisoprene, polysiloxane, polysulfide, polyurethane, styrene-butadiene and the like and mixtures thereof.

A wide variety of volatile organic solvents can be used in the present invention. The volatile organic solvent should be readily evaporable at ambient temperatures. Suitable solvents include paraffinic hydrocarbon solvents such as pentanes, hexanes, octanes, naphthas, cyclopentane, cyclohexane and the like and mixtures thereof; aromatic hydrocarbon solvents such as benzene, toluene, xylene and the like and mixtures thereof; halogen-containing hydrocarbons such as carbon tetrachloride, methyl chloride, methylene chloride, trichloroethane, perchloroethylene, trichloroethylene and the like and mixtures thereof; oxygen-containing hydrocarbons, for example, esters, ethers, aldehydes and ketones, such as acetone, butyl ether, dichloroethyl ether, methyl ethyl ketone, methyl isobutyl ketone and the like and mixtures thereof. Generally, alcoholic solvents are not very effective for use in softening the binder material which holds the pigment particles or as carriers for the elastomeric material, however, there are cases where alcoholic solvents are effective and in such cases they can be used either alone or in mixtures with the above named solvents. Any of the above named classes of solvents can be used alone or in mixtures provided they soften the binder material and act as suitable carriers for the elastomeric material.

The composition comprising the elastomeric material and the volatile organic solvent can be a solution, mixture, dispersion, colloid, suspension, gel or a mixture thereof which is of a uniform consistency.

The composition comprising the elastomeric material and the organic solvent can be prepared in a conventional manner. Suitable mixing means include magnetic stirrers, mechanical stirrers, blenders, rubber mills and the like.

The composition comprising the elastomeric material and the organic solvent can be applied to the encoded surface of the medium in any convenient manner. Suitable application means include, for example, brushing, knife-edge coating, application from a collapsible tube or a combination of these or other similar means whereby a thin film is deposited on the encoded surface of the medium. When the organic solvent has substantially evaporated, the thin elastomeric film can be easily removed from the medium in any convenient manner. Suitable removal means include gentle peeling or stripping wherein there is no substantial damage to the erased medium. Suitable pressure sensitive tapes, for example, non-fiber tearing tapes can be used to strip the thin elastomeric film from the medium. Removal of the elastomeric film from the surface of the medium produces an erased area on the medium which is suitable for re-encoding.

The erasure process of the present invention can be carried out at room temperature. It is not necessary to apply heat to either the composition comprising the elastomeric material and the organic solvent nor is it necessary to apply heat to the encoded medium to produce suitable erasures. However, it may be desirable to apply heat to either the composition comprising the elastomeric material and the organic solvent or the medium to accelerate evaporation of the organic solvent and thus shorten the time required for removal of the dry transfer pigmented ink from the medium. Suitable heating can be accomplished by conduction, convection or by radiation heating means. Typical examples of these heating means are a heated plate or roller, a forced air heater and an infrared lamp. The heating can be conducted in any convenient manner provided that no portion of the medium is heated to a temperature wherein there is thermal damage to the medium or the residual elastomeric material adheres so tenaciously to the medium as to produce tearing of the surface of the medium.

The composition comprising the elastomeric material and the organic solvent can contain various additives and modifiers such as antioxidants, coloring agents, extenders, fillers or materials which can assist as absorbents for the erased dry transfer pigmented ink. Other additional materials such as viscosity control agents and thickeners, for example finely divided silica, can also be added to the composition comprising the elastomeric material and the organic solvent to control flow properties of the composition and the degree of penetration of either the organic solvent or the elastomeric material into the encoded medium. The inclusion of such additives and modifiers is not essential to the process of the present invention since the composition comprising the elastomeric material and the organic solvent alone provides suitable erasures.

The amount of contact of the composition comprising the eastomleric material and the organic solvent with the encoded surface of the medium required for substantial erasure of the dry transfer pigmented ink can be an amount sufficient only to provide an intimate contact of the composition comprising the elastomeric material and the organic solvent with the encoded surface of the medium. The process of the present invention does not require significant contact pressures for satisfactory performance.

The encoded media which can be erased in accordance with the process of the present invention includes a wide variety of encoded media. Encoded paper record media such as rag tissue, glassine, bond, safety, tab card, cylinder machine paper board and the like are especially suitable for erasure by the process of the present invention. These paper record media have a wide variety of basis weights, for example, ranging from about 3 pounds per ream for

rag tissue and about 16 pounls per ream for bond to about 75 pounds per ream for cylinder board paper stock. A ream of paper record media is defined herein as about 500 sheets of paper, each sheet of paper being 17 inches by 22 inches and each sheet of paper having a thickness of 0.5 to 15 mils. Other suitable media include encoded synthetic polymeric surfaces and films of nylon, polyethylene, polypropylene, polyester and the like. Suitable media also include encoded fabric media, such as woven and non-woven fabrics of silk, cotton, wool, glass, nylon, polyester, rayon and the like and blends thereof.

In a preferred embodiment of the present invention, dry transfer magnetic ink is erased from an encoded paper record medium. The process of the present invention produces such excellent removal of encoded dry transfer magnetic inks from paper record media that the residual signal of an erased document is usually so slight that it can be considered to be undetected by the reading means. Furthermore, the media can be re-encoded using the same or different dry transfer magnetic inks to produce re-encoded media of comparable quality to that of original encoded media.

PREFERRED EMBODIMENTS

The following examples illustrate the present invention and modes of carrying out the invention.

Example I

Twenty-four (24) pound safety paper (17 in. x 22 in. x 500 sheets) which is a commonly used paper for bank checks was encoded on a C–481 Encoder, manufactured by The National Cash Register Company; Dayton, Ohio, U.S.A., using a commercially available dry transfer magnetic ink ribbon. The dry transfer ribbon comprised a 5 pound tissue (20 in. x 30 in. x 480 sheets) base or support member coated with a magnetic iron oxide dispersed in a silicone resin and a silicone rubber gum binder system. The silicone binder system coating containing the magnetic iron oxide was coated with a thin coating of wax. The silicone binder system containing the magnetic iron oxide was of the following composition expressed as parts by weight.

Component:	Parts by weight
Black magnetic iron oxide powder	1,043
Linear dimethyl polysiloxane rubber gum	605
Methyl-phenyl substituted polysiloxane resin	336

The above silicone binder system containing the magnetic iron oxide was coated onto the tissue base in a conventional manner using toluene as a carrier.

After the magnetic ink was encoded or printed on the safety paper, the encoded safety paper was electronically scanned using calibrated measuring equipment comprising a Whirly Sig Mark II Magnetic Ink Tester manufactured by Kidder Press Company; Dover, N.H., U.S.A. connected to a Tektronix 564 Storage Oscilloscope manufactured by Tektronix Incorporated; Beaverton, Oreg., U.S.A., to determine the dynamic signal level of the encoded or printed characters on the safety paper and to establish a control on the nominal signal of one of the base characters. The signal level measuring instrument was calibrated using a secondary signal level reference document obtained from the Bank Administration Institute, Park Ridge, Ill., U.S.A. The signal level as used herein is defined as the amplitude of the voltage waveform produced when a direct current magnetized printed character is scanned by a suitable magnetic reading head.

Encoded characters on the safety paper were erased in the following manner. A composition comprising an elastomeric material and an organic solvent was prepared by adding 15 parts by weight of uncured cis-1,4-polyisoprene natural rubber of smoked sheet grade in granular form to 85 parts by weight of toluene. The rubber and the toluene were mixed at room temperature using a conventional magnetic stirrer until a smooth and uniform paste having a viscosity of about 8,000 centipoises was obtained. The composition comprising the rubber and toluene was placed in a conventional squeeze applicator tube and a portion of the composition comprising the rubber and toluene was applied as a substantially continues thin film to encoded characters on the surface of the safety paper. The toluene was allowed to evaporate from the rubber leaving a thin, substantially dry rubber film having a thickness of about 1 to 2 mils. The thin rubber film was manually peeled off the surface of the safety paper thereby leaving the contacted surface of the safety paper cleanly erased.

The erased safety paper was electronically scanned in the same manner as described above to determine the signal level of any residual magnetic ink particles. The signal level was almost undetectable thereby indicating that the safety paper was cleanly erased and proving the effectiveness of the erasure process of the present invention.

The erased safety paper was re-encoded with different encoded or printed characters using the same type encoder and the same type dry transfer magnetic ink ribbon as described above. The re-encoded safety paper was electronically scanned in the same manner as described above to determine the quality of the signal level. The signal level of the electronically scanned re-encoded safety paper was of good quality and the signal waveforms were clean and free from extraneous signals of residual magnetic ink particles. The signal level of the re-encoded safety paper was compared to the signal level of an originally encoded safety paper, that is, an encoded saftey paper which had not been erased and re-encoded, and the quality of the signal level of the re-encoded safety paper was found to be comparable to that of the originally encoded safety paper.

This example illustrates that an encoded medium can be erased by the process of the present invention and re-encoded with no significant loss in print quality.

Example II

A selection of different media were encoded on the C–481 Encoder described in Example I using the commercially available dry transfer magnetic ink ribbon described in Example I. After the magnetic ink was encoded or printed on each medium, each encoded medium was electronically scanned in the same manner as described in Example I.

The encoded media comprised paper record stocks having a ream basis of 17 in. x 22 in. x 500 sheets, synthetic polymer films, a natural and a synthetic fabric. The media are listed below in Table I.

TABLE I.—ENCODED MEDIUM

(1) White rag tissue—3 pounds per ream
(2) White bond—16 pounds per ream
(3) White bond—20 pounds per ream
(4) Tab card—44 pounds per ream
(5) Cylinder machine paper board—75 pounds per ream
(6) Glassine—16 pounds per ream
(7) Nylon film—1 mil thick
(8) Polyester film—1 mil thick
(9) Cotton fabric—5 mil thick, 2.5 oz. per sq. yd., thread count—300 per inch
(10) Nylon fabric—5 mil thick, 2.5 oz. per sq. yd.

The above encoded media were erased in accordance with the process of the present invention in the same manner as described in Example I and comparable results were obtained. Each encoded medium was cleanly erased thereby proving the effectiveness of the erasure process of the present invention using different media.

The erased media were re-encoded in the same manner as described in Example I. The print quality was comparable to that obtained in Example I thereby illustrating that various types of encoded media can be erased by the process of the present invention and re-encoded with no significant loss in print quality.

Example III

Twenty-four (24) pound safety paper (17 in. x 22 in. x 500 sheets) was encoded, erased and re-encoded in the same manner as described in Example I except that other elastomeric materials were evaluated in place of the uncured cis-1,4-polyisoprene natural rubber of smoked sheet grade used in Example I. The compositions comprising each elastomeric material and organic solvent were prepared and applied in the same manner as described in Example I. Comparable results were obtained as compared to those of Example I. The various elastomeric materials evaluated are listed below in Table II. Each encoded safety paper was clearly erased as in Example I thereby proving the effectiveness of the erasure process of the present invention using different elastomeric materials to produce erasure.

The print quality of each re-encoded safety paper was comparable to that obtained in Example I thereby illustrating that encoded media can be erased by the process of the present invention using different elastomeric materials and re-encoded with no significant loss in print quality.

TABLE II

Elastomeric material	Manufacturer	Trademark	Description	Parts by weight: Elastomeric material	Parts by weight: Toluene	Viscosity of composition comprising elastomeric material and toluene, cps.
Polyisoprene (Synthetic).	Goodyear Tire and Rubber Co.	Natsyn 400	Cis-1,4 polyisoprene; specific gravity, 0.91; Mooney viscosity (ML, 212° F.), 75 to 95; cis-1.4 content, 97%; Tg of 72° C.; avg. molecular weight, 350,000 to 400,000.	5	95	11,000
Polybutadiene	do	Budene 502	1,4 polybutadiene; specific gravity, 0.91; Mooney viscosity (ML, 212° F.), 45.	10	90	10,250
Chlorosulfonated polyethylene.	DuPont	Hypalon 40	Specific gravity, 1.18; Mooney viscosity (ML, 212° F.), 55; 34.5 percent Cl; 0.9 percent S.	10	90	7,000
Polysiloxane	General Electric Co.	SE 76	Dimethyl polysiloxane gum; specific gravity, 0.98; Williams Plasticity No. 75 to 120; Avg. molecular weight 340,000 to 390,000.	15	85	4,000

Example IV

Twenty-four (24) pound safety paper (17 in. x 22 in. x 500 sheets) was encoded, erased and re-encoded in the same manner as described in Example I except that a mixture of elastomeric materials was evaluated. The composition comprising the elastomeric materials and the solvent was prepared and applied in the same manner as described in Example I by mixing 7.5 parts by weight of uncured cis-1,4-polyisoprene natural rubber of smoked sheet grade and 7.5 parts by weight of isobutylene-isoprene synthetic rubber, commonly known as butyl rubber, in granular form in 85 parts by weight of toluene. The encoded safety paper was clearly erased as in Example I thereby proving the effectiveness of the erasure process of the present invention using a mixture of different elastomeric materials to produce erasure.

The print qualtity of the re-encoded safety paper was comparable to that obtained in Example I thereby illustrating that encoded media can be erased by the process of the present invention using a mixture of different elastomeric materials and re-encoded with no significant loss in print quality. This example is further significant because it shows that elastomeric materials can be selected for certain physical or chemical properties they possess and be operable in the erasure process of the present invention.

Example V

Twenty-four (24) pound safety paper (17 in. x 22 in. x 500 sheets) was encoded, erased and re-encoded in the same manner as described in Example I except that two different dry transfer pigmented ribbons were evaluated in place of the dry transfer magnetic ink ribbon used in Example I.

One dry transfer ribbon comprised a 40 gauge Pliofilm (rubber hydrochloride) base or support member coated with a magnetic iron oxide dispersed in an ethyl cellulose binder system. The ethyl cellulose binder system coating containing the magnetic iron oxide was coated with a thin coating of mineral wax.

The other dry transfer ribbon comprised a 75 gauge polyethylene film base or support member coated with a single coating of a magnetic iron oxide and a vegetable wax dispersed in an ethyl cellulose binder system.

Each encoded safety paper was cleanly erased as in Example I thereby proving the effectiveness of the dry erasure process of the present invention using different dry transfer pigmented ribbons.

The print quality of each re-encoded safety paper was comparable to that obtained in Example I thereby illustrating that encoded media can be erased by the process of the present invention and re-encoded using different dry transfer pigmented ribbons with no significant loss in print quality.

Example VI

Safety papers which were erased in accordance with Example IV using the two different dry transfer pigmented ribbons were re-encoded using the dry transfer magnetic ink ribbon described in Example I in the same manner as described in Example I.

The print quality of each re-encoded safety paper was comparable to that obtained in Example I thereby illustrating that encoded media can be erased by the process of the present invention and re-encoded using a different dry transfer pigmented ribbon with no significant loss in print quality.

Example VII

Twenty-four (24) pound safety paper (17 in. x 22 in. x 500 sheets) was encoded, erased and re-encoded in the same manner as described in Example I except that 1,1,1, trichloroethane was substituted for toluene as the volatile organic solvent. The encoded safety paper was cleanly erased as in Example I thereby proving the effectiveness of the erasure process of the present invention using a relatively non-toxic and non-flammable solvent.

The print quality of the re-encoded safety paper was comparable to that obtained in Example I thereby illustrating that encoded media can be erased by the process of the present invention using a relatively non-toxic and non-flammable solvent. This example is significant because of the obvious safety advantages gained by the use of a relatively non-toxic and non-flammable solvent.

What is claimed is:

1. An erasure process for the substantial removal of a dry transfer pigmented ink from an encoded medium which comprises applying a composition comprising an elastomeric material and a volatile organic solvent to the encoded surface of the medium as a substantially continuous thin film; evaporating the organic solvent from said composition thereby leaving a thin, substantially dry elastomeric film on the surface of the medium; then removing the thin, substantially dry elastomeric film from the encoded surface thereby removing dry transfer pigmented ink from the medium contacted by the elastomeric film without any substantial damage to the erased medium, said composition comprising the elastomeric material and the volatile organic solvent containing about 5 to 30 weight percent elastomeric material, based upon the

weight of the elastomeric material and the volatile solvent, and having a viscosity of about 50 to 40,000 centipoises.

2. The erasure process of claim 1 wherein the elastomeric material is natural rubber or cis-1,4-polyisoprene.

3. The erasure process of claim 1 wherein the elastomeric material is synthetic polyisoprene.

4. The erasure process of claim 1 wherein the elastomeric material is polybutadiene.

5. The erasure process of claim 1 wherein the elastomeric material is chlorosulfonated polyethylene.

6. The erasure process of claim 1 wherein the elastomeric material is polysiloxane.

7. The erasure process of claim 1 wherein the elastomeric material comprises a mixture of at least two different elastomeric materials.

8. The erasure process of claim 1 wherein the volatile organic solvent is toluene.

9. The erasure process of claim 1 wherein the volatile organic solvent is 1,1,1 trichloroethane.

10. The erasure process of claim 1 wherein the composition comprising the elastomeric material and the volatile organic solvent contains about 10 to 15 weight percent elastomeric material, based upon the weight of the elastomeric material and the volatile organic solvent, and has a viscosity of about 600 to 11,000 centipoises.

11. The erasure process of claim 1 wherein the thin,

substantially dry elastomeric film on the surface of the medium has a thickness of about 0.5 to 5 mils.

12. The erasure process of claim 1 wherein the encoded medium is a paper record medium.

13. The erasure process of claim 1 wherein the encoded medium is a synthetic polymeric material.

14. The erasure process of claim 1 wherein the encoded medium is a woven or non-woven fabric.

15. The erasure process of claim 1 wherein the dry transfer pigmented ink is a magnetic iron oxide pigmented ink.

References Cited

UNITED STATES PATENTS

2,884,348	4/1959	Kulesza	346—21 X
3,079,284	2/1963	Boucher	134—4
3,080,263	3/1963	Conrose	134—4
3,112,151	11/1963	Buros	346—1
3,476,599	11/1969	Grover et al.	134—4
3,536,571	10/1970	Grundman	156—584

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